Year 7 and 8 (ENGLISH VERSION)

Thursday, 16th March 2017 Time allowed: 75 minutes

1. For each question exactly one of the 5 options is correct.
2. Each participant is given 30 points at the beginning. For each correct answer 3, 4 or 5 points are added. No answer means 0 points are added. If a wrong answer is given, one quarter of the points is subtracted, i. e. 0.75 points, 1 point or 1.25 points, respectively. At the end, the maximum number of points is 150, the minimum is 0.
3. Calculators and other electronic devices are not allowed.

3 point problems

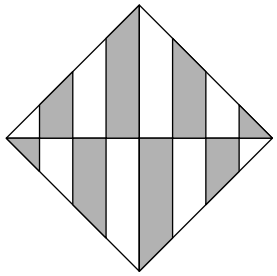
A1 What time is it 20 hours after 17:00 ?

(**A**) 10:00 (**B**) 11:00 (**C**) 12:00 (**D**) 13:00 (**E**) 14:00

A2 Which of the following equalities is true?

(**A**) $\frac{4}{1} = 1.4$ (**B**) $\frac{5}{2} = 2.5$ (**C**) $\frac{6}{3} = 3.6$ (**D**) $\frac{7}{4} = 4.7$ (**E**) $\frac{8}{5} = 5.8$

A3 In the square shown in the diagram on the right, each stripe has the same width. What fraction of the area of the square is grey?

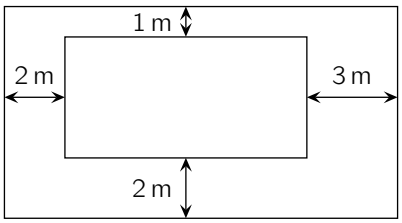


(**A**) $\frac{1}{2}$ (**B**) $\frac{1}{3}$ (**C**) $\frac{2}{3}$ (**D**) $\frac{3}{4}$ (**E**) $\frac{2}{5}$

A4 Which number must be subtracted from -17 to obtain -71 ?

(**A**) -88 (**B**) -54 (**C**) 27 (**D**) 54 (**E**) 88

A5 The diagram shows two rectangles whose corresponding sides are parallel. What is the difference between the lengths of the perimeters of the two rectangles?

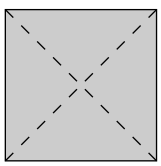


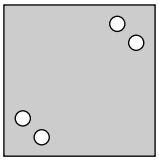
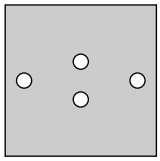
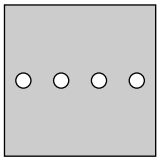
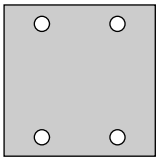
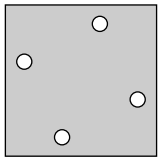
(**A**) 12 m (**B**) 13 m (**C**) 16 m
(**D**) 17 m (**E**) 20 m

A6 The sum of three different positive integers is 7. What is the product of these three integers?

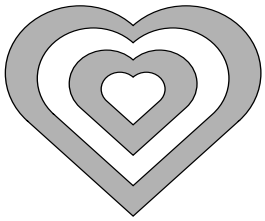
(**A**) 8 (**B**) 9 (**C**) 10 (**D**) 12 (**E**) 14

A7 Fynn folds a piece of paper along the dashed lines. Then, he punches one hole in the folded piece of paper. Which 4 holes could Fynn see when he unfolds the paper?



(**A**)  (**B**)  (**C**)  (**D**)  (**E**) 

A8 The diagram shows four overlapping hearts, two made from dark paper and two made from light paper. The areas of the hearts are $16\,\text{cm}^2$, $9\,\text{cm}^2$, $4\,\text{cm}^2$ and $1\,\text{cm}^2$. What is the total visible dark area?



(**A**) 9 cm^2 (**B**) 10 cm^2 (**C**) 11 cm^2 (**D**) 12 cm^2 (**E**) 13 cm^2

A9 Jan picked 16 strawberries. Each of his two sisters picked 10 strawberries. How many strawberries does Jan need to give to each of his sisters so that each of the three children has the same number of strawberries?

(**A**) 2 (**B**) 3 (**C**) 4 (**D**) 5 (**E**) 6

A10 The sum of the digits of a five-digit number is 42. Four of the digits are equal. What is the fifth digit?

(**A**) 1 (**B**) 8 (**C**) 3 (**D**) 4 (**E**) 6

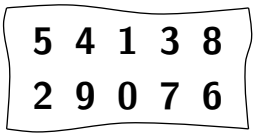
4 point problems

B1 Annie the Ant started at the left-hand end of a pole and crawled $\frac{2}{3}$ of its length.

Benny the Beetle started at the right-hand end of the same pole and crawled $\frac{3}{4}$ of its length. What fraction of the length of the pole are Annie and Benny now apart?

(**A**) $\frac{3}{8}$ (**B**) $\frac{1}{12}$ (**C**) $\frac{5}{7}$ (**D**) $\frac{1}{2}$ (**E**) $\frac{5}{12}$

B2 Which two digits on the note shown on the right must be swapped such that one of the five-digit numbers is twice the other five-digit number?



(**A**) 4 and 9 (**B**) 4 and 6 (**C**) 1 and 5 (**D**) 7 and 9 (**E**) 2 and 5

B3 At the "Peter Pan" performance in the theatre, one sixth of the audience are adults. Three fifths of the children are boys. What fraction of the audience are girls?

(**A**) $\frac{1}{2}$ (**B**) $\frac{1}{3}$ (**C**) $\frac{1}{4}$ (**D**) $\frac{1}{5}$ (**E**) $\frac{1}{6}$

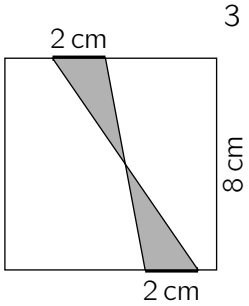
B4 In the diagram, the zigzag path and the straight line from A to B form seven equilateral triangles. The length of the straight line is 20. What is the length of the zigzag path?

(**A**) 30 (**B**) 40 (**C**) 50 (**D**) 60 (**E**) 70

B5 This year there were more than 800 runners participating in the "Teams in Motion" running event. Exactly 35 % of the runners were female, and there were 252 more males than females. How many runners were there in total?

(**A**) 802 (**B**) 810 (**C**) 822 (**D**) 824 (**E**) 840

B6 Two segments, each 2 cm long, are marked on opposite sides of a square of side length 8 cm. The ends of the segments are joined as shown in the diagram. What is the shaded area?



(**A**) 4 cm^2 (**B**) 8 cm^2 (**C**) 12 cm^2 (**D**) 16 cm^2 (**E**) 20 cm^2

B7 Giovanni wants to cut a piece of string into 9 pieces of equal length. He marks his cutting points on the string. Barbara wants to cut the same piece of string into only 8 pieces of equal length. She also marks her cutting points on the string. Ana then cuts the string at all the cutting points that are marked. How many pieces of string does Ana obtain?

(**A**) 15 (**B**) 16 (**C**) 17 (**D**) 18 (**E**) 19

B8 Emily wants to write a number into each cell of a 3×3 grid. She wants to do this in such a way that the sum of the numbers in any two cells that share an edge is the same. Emily has already written two numbers, as shown. When she has completed the grid, what will be the sum of all nine numbers in the grid?

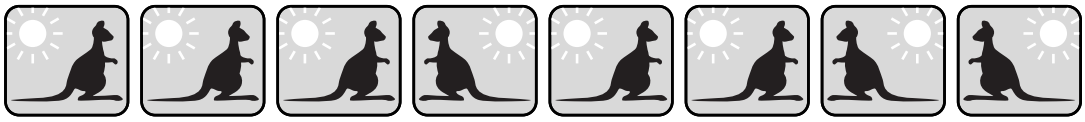
2		
		3

(**A**) 19 (**B**) 20 (**C**) 21 (**D**) 22 (**E**) 23

B9 Tiko wants to prepare a jogging timetable. He wants to jog exactly two days per week and on the same days every week. He never wants to jog on two consecutive days. How many different timetables could Tiko prepare?

(**A**) 8 (**B**) 10 (**C**) 12 (**D**) 14 (**E**) 16

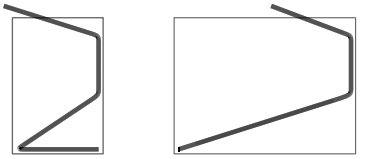
B10 Eight kangaroo pictures are put in a line, as shown in the diagram. Then, two pictures with kangaroos lying nose-to-nose are exchanged. This is repeated until no further such exchanges are possible. How many exchanges must be made?

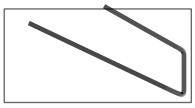
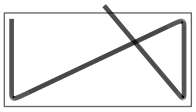
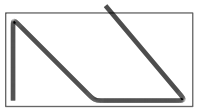
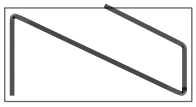
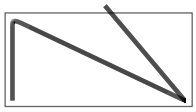


(**A**) 9 (**B**) 10 (**C**) 13 (**D**) 15 (**E**) 16

5 point problems

C1 For an exhibition Mr. Lightning laid cables for the illumination of the glass display cases. A piece of cable is hanging in one of the display cases. The view on this display case from the left and from the front is shown on the right. What is the view on this display case from above?



(**A**)  (**B**)  (**C**)  (**D**)  (**E**) 

C2 The four statements on the right were made about an integer n. They are alternately true and false. What ist n?

(**A**) 13 (**B**) 14 (**C**) 15 (**D**) 16 (**E**) 17

(1) n is not larger than 13.
(2) n is not a prime number.
(3) n is not odd.
(4) n is not larger than 17.

C3 Buses leave the airport every 3 minutes to travel to the city centre. A car leaves the airport 2 minutes after a bus left and travels to the city centre by the same route. It takes each bus 60 minutes and the car 35 minutes to travel from the airport to the city centre. How many of these airport buses does the car pass on its way to the city centre?

(**A**) 7 (**B**) 8 (**C**) 10 (**D**) 11 (**E**) 12

C4 Ingrid's tablecloth has a regular pattern, as shown in the diagram. What percentage of Ingrid's tablecloth is black?

(**A**) 16 % (**B**) 24 % (**C**) 25 % (**D**) 32 % (**E**) 36 %

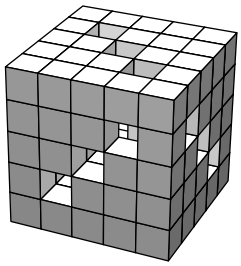
C5 The numbers of degrees of the angles in a triangle are three different integers. What is the minimum possible sum of its smallest and largest angles?

(**A**) 90° (**B**) 91° (**C**) 120° (**D**) 121° (**E**) 122°

C6 The sequence $2, 3, 6, 8, 8, \ldots$ starts with 2 and 3, and afterwards each digit is the last digit of the product of the two preceding digits. The 6th digit in this sequence is 4, since $8 \times 8 = 64$ ends in 4, the 7th digit is 2, since $8 \times 4 = 32$ ends in 2, and so on. What is the 2017th digit in this sequence?

(**A**) 2 (**B**) 3 (**C**) 4 (**D**) 6 (**E**) 8

C7 Mike built a $5\times5\times5$ cube from $1\times1\times1$ cubes. Then, he punched out nine tunnels leading through the whole cube, as shown in the diagram. How many of the small cubes does the remaining solid consist of?

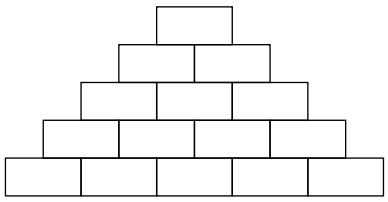


(**A**) 73 (**B**) 80 (**C**) 83 (**D**) 86 (**E**) 89

C8 Hakan and Vivien are training on a 720 metre circular track. They run in opposite directions, each at a constant speed. Hakan takes four minutes to complete the full circuit, and Vivien takes five minutes. How far does Vivien run between two consecutive meetings of the two runners?

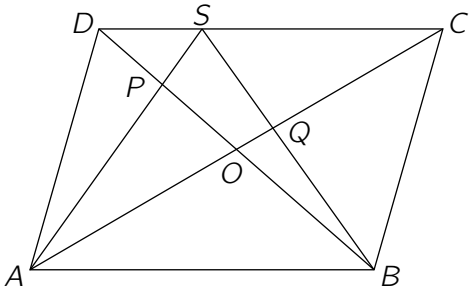
(**A**) 355 m (**B**) 350 m (**C**) 340 m (**D**) 330 m (**E**) 320 m

C9 Sarah wants to put numbers in the number pyramid shown in such a way that each number above the bottom row is the sum of the two numbers immediately below it. What is the *largest* number of *odd* numbers that Sarah could put in the pyramid?



(**A**) 7 (**B**) 8 (**C**) 9 (**D**) 10 (**E**) 11

C10 The diagram shows a parallelogram $ABCD$ with area F. The diagonals of $ABCD$ meet at the point O. The point S is on CD. The lines AS and BD meet at P, and the lines BS and AC meet at Q. The sum of the areas of the triangles APD and BCQ is $\frac{1}{3}F$. What is the area of the quadrilateral $SPOQ$, in terms of F?



(**A**) $\frac{1}{8}F$ (**B**) $\frac{1}{10}F$ (**C**) $\frac{1}{12}F$ (**D**) $\frac{1}{14}F$ (**E**) $\frac{1}{16}F$